

What is claimed is:

1. A magnetic recording medium having a nonmagnetic substrate on which is provided at least a softly magnetic under-film, an orientation control film that controls an orientation of a film directly above, a perpendicular magnetic recording film having an axis of easy magnetization oriented to be mainly perpendicular to the substrate, and a protective film, wherein the orientation control film is alloy containing at least Cr and C.
2. The magnetic recording medium according to claim 1, wherein the orientation control film has a C content that is not less than 10 at% and not more than 80 at%.
3. The magnetic recording medium according to claim 1, wherein the orientation control film has a C content that is not less than 30 at% and not more than 70 at%.
4. The magnetic recording medium according to claim 1, wherein the orientation control film has a Cr content that is not less than 3 at% and not more than 80 at%.
5. The magnetic recording medium according to claim 1, wherein the orientation control film has a thickness that is not less than 0.5 nm and not more than 20 nm.
6. The magnetic recording medium according to claim 2, wherein the orientation control film has a thickness that is not less than 0.5 nm and not more than 20 nm.
7. The magnetic recording medium according to claim 1, wherein the perpendicular magnetic recording film is formed of a material containing at least Co and Pt.
8. The magnetic recording medium according to claim 2, wherein the perpendicular magnetic recording film is formed of a material containing at least Co and Pt.

9. A method of manufacturing the magnetic recording medium according to claim 1, comprising carrying out, in order, at least a step of forming a softly magnetic under-film on a nonmagnetic substrate, a step of forming an orientation control film that controls an orientation of a film directly above, a step of forming a perpendicular magnetic recording film having an axis of easy magnetization oriented to be mainly perpendicular to the substrate, and a step of forming a protective film.

10. A method of manufacturing the magnetic recording medium according to claim 2, comprising carrying out, in order, at least a step of forming a softly magnetic under-film on a nonmagnetic substrate, a step of forming an orientation control film that controls an orientation of a film directly above, a step of forming a perpendicular magnetic recording film having an axis of easy magnetization oriented to be mainly perpendicular to the substrate, and a step of forming a protective film.

11. A magnetic recording and reproduction apparatus comprising the magnetic recording medium according to claim 1 and a magnetic head that records and reproduces information on the magnetic recording medium, wherein the magnetic head is a magnetic monopole head.

12. A magnetic recording and reproduction apparatus comprising the magnetic recording medium according to claim 2 and a magnetic head that records and reproduces information on the magnetic recording medium, wherein the magnetic head is a magnetic monopole head.